

Biology and Classification of Dwarf Mistletoes (Arceuthobium). By F. G. HAWKSWORTH and D. WIENS. 234 pp. U.S. Govt. Printing Office, Washington, D.C. 1972. \$4.50.

The long-awaited monograph of dwarf mistletoes has now appeared. It is a hard-cover book that, because of its professional appearance and low price, and through the fact that it is an official government publication, will undoubtedly be the standard handbook on the subject for decades. It therefore needs to be scrutinized and carefully evaluated at the outset, especially since its taxonomic conclusions are a drastic departure from most previous views. Much of the more important work has been previously published by the authors in various botanical journals.

The treatment begins with a brief introduction and historical sketch, after which the life cycle is followed through and general distributional summaries are provided. Host relationships are also treated in detail. Under the heading "Mechanisms and trends of evolution" we find factual information and exceedingly tenuous threads of argumentation in a blend that leaves me with a distinctly uneasy feeling. Among other things, the obvious is being rather overworked when we read (p. 36) that "The genetic system is presumably sexual and obligately out-crossing (the genus being dioecious)" and such statements as "But if hybrids do not occur, we could hardly expect to find literature on the subject."

Under the heading "Systematics of *Arceuthobium*" the taxonomic views of the authors are explained. It is by now clear that much of the writing that precedes the formal taxonomic treatment is preparatory to the more radical features of the latter. In the first systematics section the authors appeal to Danser's contention to the effect that the business of taxonomy is the classification of life cycles. Phenological data, therefore, are greatly emphasized. To anyone acquainted with the taxonomic practice of Danser the situation will seem very ironical, for Danser could hardly have anticipated that his views would lead to what has now happened to *Arceuthobium*. At any rate, the systematics section reads like an apologia, leading to expressions such as the following sentences: "Whether . . . differences are easily discernible in a particular specimen in no way affects their intrinsic taxonomic value. The distinctions between classification and ease of identification should not be confused". I may be forgiven if I feel that this clashes with the authors' expressed objective (p. 2) "to develop a useful, yet natural system of classification for *Arceuthobium*". It is fortunate for the working botanist that convenience does play a role in the taxonomic treatments of most of his colleagues.

The crucial item of the authors' "modus operandi" is perhaps expressed on pp. 41 and 42. They find no evidence of hybridization. While I do not need to be convinced of the possible significance of this, I am by no means convinced that intermediates between many of Hawksworth and Wiens' species could be easily spotted. This, and the morphological integrity of groups is taken to mean that they should be recognized as species. It is emphatically denied that the ecotype concept can be utilized; nothing but the species will do. It is nevertheless admitted that some of the dwarf mistletoes accorded specific rank "might correspond to regional ecotypes" to which the authors add, rather lamely ". . . but most taxonomists consider regional ecotypes to be comparable to subspecies so the taxonomic treatment would not be greatly different".

The results are spectacular. California, which in the evaluation of virtually everyone else in this century has had three species (*A. americanum*, *A. campylopodium*, and *A. douglasii*), now sports no fewer than nine. Even the taxon called by Gill *A. campylopodium* forma *typicum* yields two full-fledged species; Gill's forma *blumeri* is split into two more on the basis of what, I am sure, to most taxonomists will appear extremely trivial differences (p. 103). While western North America previously limped along on four species, this number has now shot up to 15.

The fundamental issue on which I disagree with the authors is their taxonomic judgment. It is no good to say that the mass of details that they have gathered supports their taxonomic concepts; it *may* support their contention that discontinu-

ities exist. But surely, discontinuity, even where demonstrated beyond a doubt, does not automatically compel us to place these groups at the specific level!

As Davis and Heywood write, in the context of taxonomic recognition of ecotypes: "The question that should be asked is what it is useful to recognize and for what purpose." Hawksworth and Wiens neither ask nor answer these two important questions. What can, indeed, be the purpose of formally recognizing and naming species that require so much sophisticated procedure to separate from one another? When a person (myself) who has worked in *Arceuthobium* for 15 years finds it impossible to distinguish between most of these new species, even with the aid of the detailed descriptions and illustrations provided, is there not something seriously wrong with that treatment?

I fear that the authors have "pulled a Trelease" in their systematic treatment. Anyone who has tried to use Trelease's monograph of *Phoradendron* will know what I mean—it is a publication that has done more harm than good in creating a vast number of new nomenclatural entities. Work in *Phoradendron* since that time has been plain hell, the fault being equally divided between *Phoradendron* and Trelease.

A comparison between the two generic treatments is by no means completely fair. Trelease's work brims with actual errors; infrageneric divisions are often quite meaningless and inconsistent, and its overall organization is dismal. No such faults can be assigned to the *Arceuthobium* treatment, which is clearly organized although I find the writing anything but smooth; most of the colored and black-and-white illustrations are good, some excellent. The detailed specimen citation and mapping also raise it far above *Phoradendron* level. Yet the overall effect, I am afraid, will be similar in that the great majority of Hawksworth and Wiens' "species" can be identified only by a few very highly trained people.

I should add that it is to the authors' great credit that they have, in previous publications, revived and/or discovered some very clearly marked Mexican species that were virtually unknown. With regard to those it is certainly extremely useful to have clear illustrations and textual analyses.

There are some unfortunate gaps. Three of the four extra-American species are neither illustrated nor mapped. While this may be understandable for the two Chinese species (I am by no means convinced that they are in any significant way different), an illustration and map of the type species, *A. oxycedri*, is a serious lack. While the title speaks of "Biology", there is no mention of the endophytic system, of hyperparasites, or the patterns of shoot-emergence from the host.

Some factual errors have also crept into the text and illustrations. The puzzling statement in the very first paragraph (and repeated in the generic description, p. 62) that the stems of *Arceuthobium* have no central vascular cylinder is perhaps traceable to a similar, vague statement in Gill's earlier monograph. The verticillate branching illustrated in Fig. 1D is quite erroneous; Fig. 2D shows an impossible sequence of young and older fruits; Fig. 3 does not illustrate a "cross-section" of the fruit as written in the legend.

One wonders also why such terms as chromatography, diploid, photoperiod, and many others need to be accommodated in a glossary. I wished the glossary, if deemed necessary, had been given more careful thought, as there are several questionable definitions. The definition of primitive taxa, for example, as "Plants that have characters also possessed by their ancestors", I find neither helpful nor defensible.

In summary, then, this monograph represents the accumulation of a vast amount of detail poured into a taxonomic mold that very few people will find usable. To a person acquainted with the genus at least north of Mexico, Hawksworth and Wiens' treatment is not designed to foster faith in computer analysis, chemotaxonomic approaches or—perhaps more fairly—in the authors' taxonomic judgment. Someone, at some future time, will have to sit down to very much the same information and try to come up with judgments in *Arceuthobium* that are more workable and meaningful than those of Hawksworth and Wiens.—JOB KUIJT, Department of Biological Sciences, University of Lethbridge, Alberta, Canada.